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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
Yoshiaki KUMAMOTO, et al.	: EXAMINER: MAI, T.
SERIAL NO: 09/868,040	:
FILED: JULY 23, 2001	: GROUP ART UNIT: 3727
FOR: MOLDED ARTICLE	:

DECLARATION UNDER 37 C.F.R. § 1.131

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

I, the undersigned, hereby declare that:

I, Kenichi Otani am employed by Kao Corporation, as a Researcher, and I am a named inventor of the invention described in U.S. Patent Application No. 09/868,040.

Independent Claim 11 of this application recites: "A molded article made predominantly of pulp . . . wherein . . . said molded article has corners of an approximately uniform thickness T2 that is greater than a thickness T1 of a portion that is not one of said corners, and said thickness T2 continuously tapers into said thickness T1."

The limitation that the thickness T2 is greater than a thickness T1 (i.e., that a ratio T2/T1 is greater than 1) and that the thickness T2 continuously tapers into the thickness T1 gives the molded article significantly superior properties when compared to the molded

articles of the prior art. Specifically, the claimed thicknesses achieve improved compressive and drop strength.

As shown in the experimental results attached hereto (see Exhibits 1-4), six containers were manufactured according to the limitations of Claim 11. The thickness of the walls and corners of each container was measured using slide calipers. The corners are illustrated in Exhibit 1, attached hereto. 750 grams of a granulated detergent was put into each of the containers. The openings of the containers were then sealed using a paper sheet with adhesive and covered by a lid.

To measure compressive strength, the container was set on a pedestal (see Exhibit 2). A metal plate was then positioned on the lid of the container, and the metal plate was pushed down at a rate of 20 mm/min until the container was broken by the compression force. Three pieces of the corners and sidewalls of the broken container were cut, and surface area, weight, and thickness for each piece were measured. The results are shown in the tables labeled thickness ratio T2/T1 vs. compressive strength and drop strength (see Exhibit 3).

To measure drop strength, the container was dropped from approximately one meter above the floor until the container cracked. Three pieces of the corners and sidewalls of the broken container were then cut and surface area, weight, and thickness for each piece were measured. The results of the drop strength testing are illustrated in the chart labeled thickness ratio T2/T1 vs. compressive strength, drop strength (Exhibit 3).

As is evident from both the compressive strength and drop strength test results, a dramatic and significant improvement in performance is seen when the ratio T2/T1 becomes 1 or greater. For example, in the compressive strength graph, when the thickness ratio T2/T1 is slightly less than 1 (e.g., 0.995), the compressive strength is only 100 N. However, when the thickness ratio T2/T1 becomes slightly greater than 1 (e.g., 1.052), the compressive

strength showed a remarkable increase to over 300 N. As the ratio T2/T1 further increases, improvement steeply continues in the products' ability to withstand compressive forces.

Similarly, the drop strength results graph indicates an dramatic improvement when the ratio between T2/T1 becomes greater than 1. As seen in the drop strength graph (see Exhibit 3), when the thickness ratio T2/T1 is slightly less than 1 (e.g., 0.995), a bottle cracked when dropped only two times. However, when the thickness ratio T2/T1 increased to just slightly above 1 (e.g., 1.052), the bottle could be dropped at least 10 times without experiencing a crack. Accordingly, from these results, it is evident that the claimed relationship between the thicknesses T2 and T1 achieve significantly improved results when compared with pulp molded articles of the past.

Independent Claim 12 of this application recites: "A molded article made predominantly of pulp . . . wherein . . . said molded article has corners of a density $\rho 2$ that is smaller than a density $\rho 1$ of a portion that is not one of said corners."

The limitation of the densities $\rho 1$ and $\rho 2$ (i.e., that a ratio of $\rho 1/\rho 2$ is less than 1) also gives the molded articles markedly superior properties when compared to the molded articles of the prior art. As set forth in the experimental data attached hereto (see Exhibit 4), the claimed densities result in significantly improved compressive strength and drop strength.

Six bottles were prepared according to the limitations recited in Claim 12. Testing similar to that set forth above regarding the bottles according to Claim 11 was performed (see Exhibit 2). The results of this testing are set forth in the graph entitled density ratio $\rho 2/\rho 1$ vs. compressive strength and drop strength. From these experimental results, it is evident that both compressive strength and drop strength greatly improved as a result of the claimed limitations (see Exhibit 4).

As is evident from the chart labeled compressive strengths when the density ratio $\rho 2/\rho 1$ is less than 1, compressive strength remains very high (i.e., in the range of more than

300-500 N). Similar results are seen with regard to the drop strength results. When the density ratio $\rho 2/\rho 1$ is less than 1, a bottle may be dropped for more than ten times without experiencing cracking in the bottle. However, when the density ratio $\rho 2/\rho 1$ increases above 1, a bottle that is dropped two times experiences cracking. Accordingly, from these results, it is evident that the claimed density ratio $\rho 2/\rho 1$ obtains significantly improved results not suggested by the art.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Kenichi Otani
Signature

Nov. 5 2003
Date

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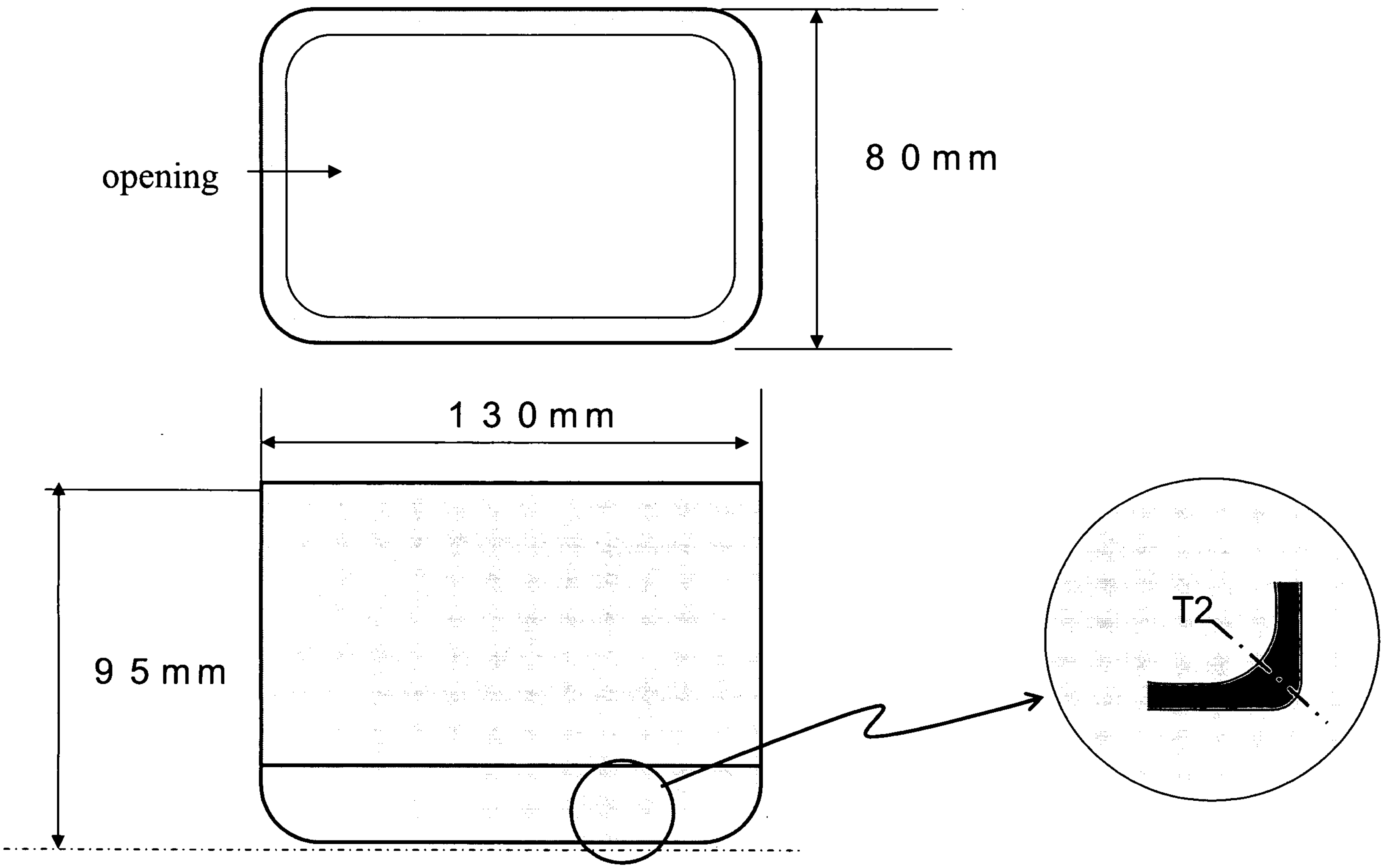
Container's dimension **EXHIBIT 1**



measurement of compressive strength and drop strength

Preparation of containers

1 . Six(6) containers of 13.0 ~ 14.0grs. were manufactured according to the description of the specification.
2.Thickness of walls and corners of each containers were measured by slide calipers.
3.750 grms of granulated detergent (“Attack”, product of Kao Corporation) was put into each containers.
4.The openings of the containers were sealed by a paper sheet with adhesive and covered by a lid.

Measurement of compressive strength

1.The container was set on a pedestal.
2.A metal plate was put on the lid of the container.
3.The metal plate was pushed down with the rate of 20mm/min.until the container was broken by the compression force.
4.Three(3)pieces of the corners and side walls of the broken container were cut and surface area, weight and thickness of each piece were measured .
5.The densities of the corner and side wall were calculated by using vales measured above.

note)

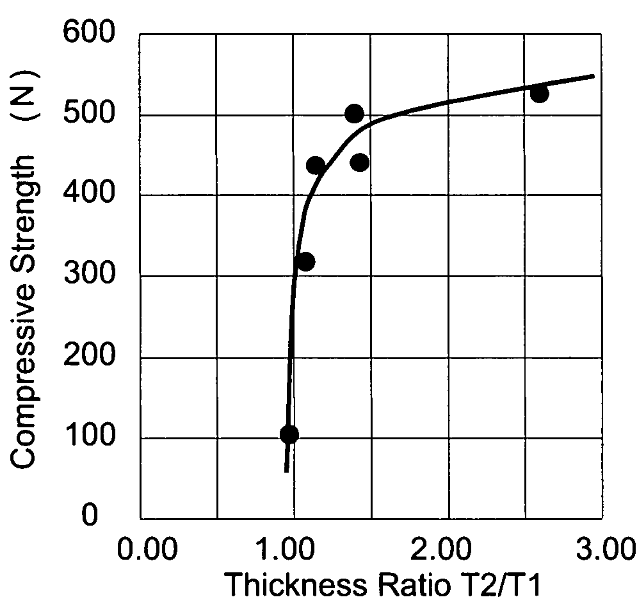
- The compression measurement apparatus is made by AIKOH ENGINEERING CO.,LTD Japan.
- Three(3)containers were used for the measurement of compressive strength.

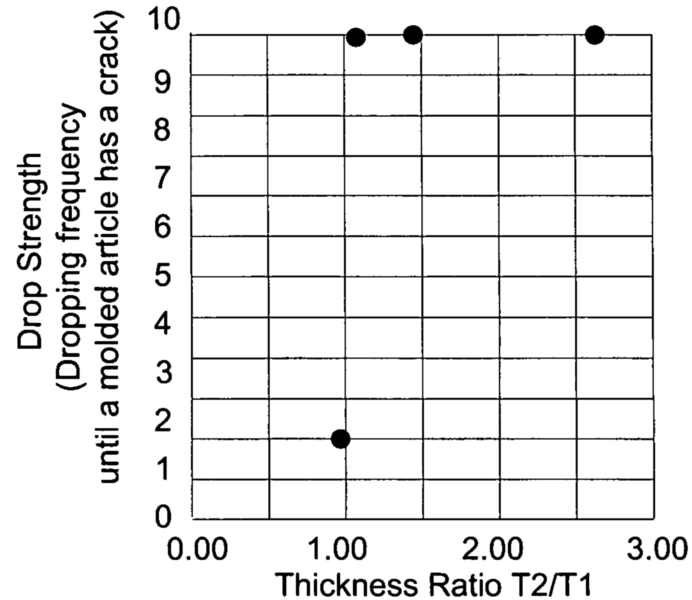
measurement of drop strength

1.The container was dropped from 1 meter high from floor until the container was cracked.
2.The step 4 described above was performed with the cracked container.
note:
・ Three(3) containers were used for the measurement of drop strength.

EXHIBIT 3

Thickness Ratio T2/T1 vs Compressive Strength,Drop Strength

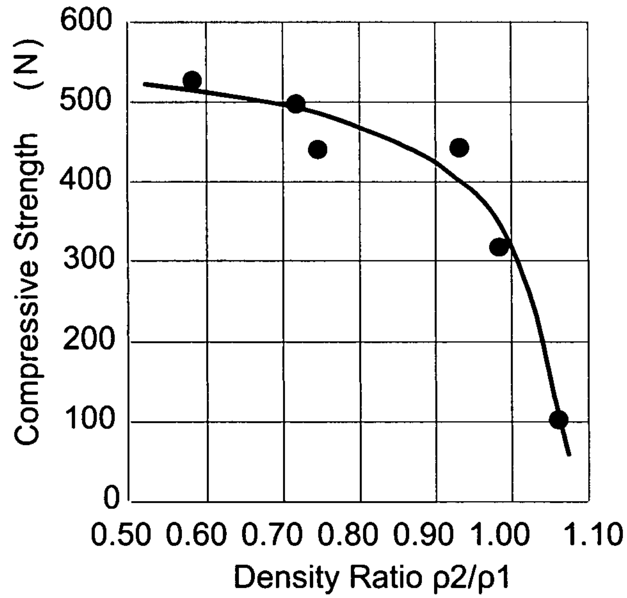


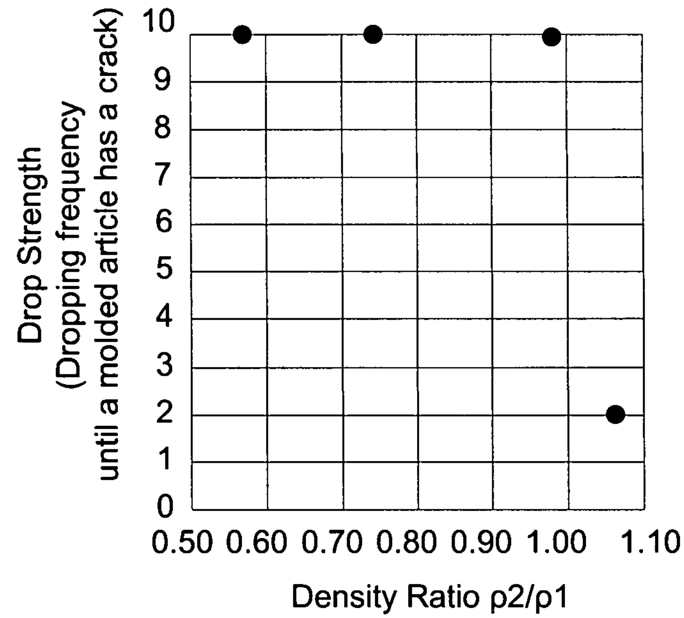


Thickness (mm) T1	Thickness (mm) T2	Thickness Ratio T2/T1	Compressive Strength (N)	Drop Strength (Dropping frequency until a molded article has a crack)	
0.550	0.593	1.078	441	---	[Example.1]
0.595	0.835	1.403	500	---	[Example.2]
0.370	0.368	0.995	104	Crack at two times dropping	
0.371	0.390	1.052	311	No crack at ten times	
0.381	0.557	1.462	439	No crack at ten times	
0.364	0.941	2.585	526	No crack at ten times	

EXHIBIT 4

Density Ratio ρ2/ρ1 vs Compressive Strength,Drop Strength





Density (g/cm3) ρ1	Density (g/cm3) ρ2	Density Ratio ρ2/ρ1	Compressive Strength (N)	Drop Strength (Dropping frequency until a molded article has a crack)	
0.852	0.791	0.928	441	---	[Example.1]
0.847	0.604	0.713	500	---	[Example.2]
0.850	0.905	1.065	104	Crack at two times dropping	
0.860	0.840	0.977	311	No crack at ten times	
0.863	0.638	0.739	439	No crack at ten times	
0.862	0.502	0.582	526	No crack at ten times	